

1. A device for producing a controlled variable resistance to apparatus including a first member moveable relative to a second member, said device comprising hydraulic actuator connecting said first member to said second member, said actuator including a housing enclosing a moveable resistance applying member separating a first chamber and a second chamber within said housing, hydraulic fluid passages connected to said chambers, hydraulic fluid within said chambers and said passages, a solenoid controlled valve connected to control the flow of hydraulic fluid through said passages, a magnet and a magnetically actuated electronic sensor arranged to sense changes in the hydraulic fluid pressure within at least one of said chambers, and a computer controlled electronic system responsive to said sensor for actuating said valve to control precisely the flow of said fluid through said valve and into and out of said first and second chambers.
2. A device as defined in claim 1 and including a position sensor for sensing the position of said first member relative to said second member and connected to said control system for applying a predetermined resistance profile to the device.
3. A device as defined in claim 2 wherein said position sensor comprises a second magnet and a second magnetically actuated electronic sensor, and a relatively moveable variable shutter spaced between said second magnet and said second electronic sensor for varying the magnetic field in response to relative movement between said first and second members.
4. A device as defined in claim 1 and including means for biasing the flow of hydraulic fluid through said valve between said first chamber and said second chamber.
5. A device as defined in claim 1 and including a first connector for connecting said first member to a partial leg of an amputee and a second connector for connecting said second member to an artificial foot for the amputee.

6. A device as defined in claim 5 wherein said control system includes an electronic sensor for sensing the force exerted on said second connector by the artificial foot while the amputee is walking.
7. A device as defined in claim 1 wherein said resistance applying member comprises a rotary shaft connected to a vane type rotor within said housing, and an endless flexible sealing member extending around said rotor and engaging said housing.
8. A device as defined in claim 1 wherein said solenoid valve comprises a two stage pilot operated valve connected to said fluid passages.
9. A device as defined in claim 1 wherein said magnet is positioned within one of said passages with a spring bias for simultaneously sensing the hydraulic fluid pressure within said first and second chambers, and said electronic sensor is positioned out of communication with said fluid and is responsive to movement of said magnet.
10. A device for producing a controlled variable resistance to apparatus including a first member moveable relative to a second member, said device comprising hydraulic actuator connecting said first member to said second member, said actuator including a housing enclosing a moveable resistance applying member separating a first chamber and a second chamber within said housing, hydraulic fluid passages connected to said chambers, hydraulic fluid within said chambers and said passages, a two stage pilot operated solenoid valve connected to control the flow of hydraulic fluid through said passages, an electronic sensor arranged to sense changes in the hydraulic fluid pressure within at least one of said chambers, and a computer controlled electronic system responsive to said sensor for actuating said valve to control precisely the flow of said fluid through said valve and into and out of said first and second chambers.
11. A device as defined in claim 10 and including a position sensor for sensing the position of said first member relative to said second

member and connected to said control system for applying a predetermined resistance profile to said device.

12. A device as defined in claim 11 wherein said position sensor comprises a magnet and a magnetically actuated electronic sensor, and a relatively moveable variable shutter spaced between said magnet and said electronic sensor for varying the magnetic field in response to relative movement between said first and second members.

13. A device as defined in claim <sup>10</sup>1 and including a first connector for connecting said first member to a partial leg of an amputee and a second connector for connecting said second member to an artificial foot for the amputee.

14. A device as defined in claim 13 and including a magnet and a magnetically actuated electronic sensor for sensing the force exerted on said second connector by the artificial foot while the amputee is walking.

15. A device as defined in claim 10 wherein said resistance applying member comprises a rotary shaft connected to a vane type rotor within said housing, and an endless flexible sealing member extending within a groove around said rotor and engaging said housing.

16. A device as defined in claim 10 <sup>and including a magnet</sup> ~~wherein said magnet is positioned~~ within one of said passages with a spring bias for simultaneously sensing the hydraulic fluid pressure within said first and second chambers, and said electronic sensor is positioned out of communication with said fluid and is responsive to movement of said magnet.

17. A device adopted for producing a controlled variable resistance to apparatus including a first member moveable relative to a second member, an actuator connecting said first member to said second member, said device comprising a housing enclosing a moveable displacement member separating a first chamber and a second chamber within said housing, fluid passages connected to said chambers and a fluid within

B

86077 "EE268T60

B

said chambers and said passages, a solenoid controlled valve connected to control the flow of fluid through said passages, a position sensor for sensing the position of said first member relative to said second member and including a magnet and a magnetically actuated electronic sensor, a variable shutter connected for movement with said first member and spaced between said magnet and said electronic sensor for variably restricting the magnetic field in response to relative movement between said first and second members, and a computer controlled electronic system responsive to said sensor for actuating said valve to control the flow of said fluid through said valve and into and out of said first and second chambers.

0918923 111098  
860TTT"EE268T60